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### CropWatch No. 97-2, March 28, 1997

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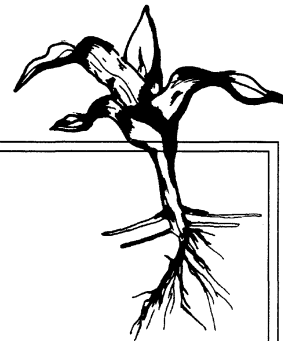


# CROP WATCH

University of Nebraska Cooperative Extension  
Institute of Agriculture and Natural Resources

No. 97-2  
March 28, 1997

## Using herbicide-resistant hybrids



Specific herbicide resistant corn cultivars (HRC) have been developed for Pursuit, Poast Plus, and Liberty, thereby increasing our herbicide options in corn. In addition to the traditional considerations for herbicide selection, such as cost, effectiveness, safety, and convenience, we must now consider hybrid selection when using any of these herbicides in corn. Remember that a herbicide resistant cultivar has a specific resistance for a specific herbicide. For example, Pursuit resistant corn is not resistant to Poast Plus or Liberty, etc.



Sethoxydim is the active ingredient in Poast Plus, a postemergence grass herbicide developed originally for soybeans. Sethoxydim kills weeds by inhibiting the acetyl-CoA carboxylase (ACC-ase) enzyme. Poast Plus offers good shattercane control and should help us manage shattercane resistance to the ALS herbicides. Weedy grasses should be treated when small (up to 4 inches tall). Shattercane can be 18 inches tall. Poast Plus has no soil residual and is usually combined with a broadleaf herbicide for broad spectrum weed control. Sethoxydim resistant (SR) corn hybrids became commercially available in 1996.

Pioneer Hi-Bred and American Cyanamid cooperated to develop corn tolerance to imidazolinone (IMI) herbicides, such as Pursuit, Lightning, etc. Pioneer released homozygous resistant (IR) corn hybrids in

### Special focus: Corn

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1992. Other seed corn companies now have IMI corn hybrids (IT) available. Imidazolinone resistance was selected from tissue cultured corn cells treated with high rates of Pursuit. The tolerant cells were regenerated into whole plants, which were used in a conventional breeding program to transfer the tolerance trait into finished hybrids. IMI hybrids also protect corn from Scepter carryover injury.

AgrEvo, a subsidiary of Hoechst-Roussel, has genetically engineered several crops to degrade glufosinate (Liberty) herbicide, which is otherwise fairly stable in plants. Glufosinate inhibits glutamine synthetase in plants which then leads to ammonia accumulation and toxicity. Liberty is a non-selective, contact postemergence herbicide, and has no preemergence effectiveness at the suggested usage rates of 20 oz to 28 oz of product per acre. Susceptible plants usually show foliar yellowing within three to five days after application. Plant death occurs in 7 to 14 days. Bright sunlight is helpful for rapid action. Apply when plants are

1- to 4-inches tall. Good spray coverage is important. AgrEvo USA recommends that Liberty be used only on hybrids designated as Liberty Link or those hybrids warranted as resistant to Liberty. At least one seed company will designate its Liberty resistant hybrids as GR (glufosinate resistant). *Be especially careful not to confuse glufosinate (Liberty) with glyphosate (Roundup).* Roundup resistant corn hybrids are not available.

With all herbicide resistant corn, the volunteer crop remains herbicide resistant, so a different herbicide (and even herbicide family) must be used to control volunteers the next year. Also, be particularly careful about spray drift or accidentally spraying a non-resistant hybrid. Double check that the corn hybrid is resistant to the specific herbicide you intend to use. Even at low dosages Liberty, Poast Plus, and Pursuit will be lethal to non-resistant hybrids.

**Fred Roeth**  
Extension Weed Scientist  
South Central District  
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## Updates

### James Stack joins plant path faculty

The Department of Plant Pathology is pleased to announce the appointment of Dr. James P. Stack as extension/research plant pathologist at the South Central Research and Extension Center at Clay Center.

Dr. Stack received his B.S. (1976) and M.S. (1978) degrees in plant pathology from the University of Massachusetts and his Ph.D. (1984) from Cornell University. He accepted a postdoctoral research position at Texas A&M University and was appointed to their faculty as an assistant professor in 1986. He joined EcoScience Corporation in Amherst, Massachusetts in 1989 where he worked with biological control agents of plant pathogens and weeds.

Dr. Stack will be responsible for plant pathology programs in the South Central and West Central districts. His focus will be on crop

diseases, with emphasis on those affecting corn, sorghum, and soybeans. He looks forward to becoming more familiar with various crop production practices and working closely with extension educators, specialists, and various clientele groups within the two districts.

Jim and his wife, Beth, and their three children are welcome additions to our Plant Pathology "family" as they take up residency in Hastings. I know you will join us in making them feel at home in Nebraska.

**David Wysong**  
Extension Plant Pathologist

### Cool forecast extended

An updated long-term forecast indicates that the below normal temperature trend predicted in the last issue of *CropWatch* is now

expected to extend through much of the corn production and harvest season. An area of below normal temperatures is indicated to develop over the northern High Plains during the May-June period and rapidly expand to cover the entire Corn Belt through the growing season and fall harvest period.

**Al Dutcher, State Meteorologist**  
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Several subscribers reported having trouble linking to the National Climate Prediction Center, whose web address was included in the last issue of *Crop Watch* (Long-term forecast: summer temps below normal, page 9). Try going to the main page at <http://nic.fb4.noaa.gov/altindex.html> and from there linking to the different forecast products.

### Corrections

In the March 14 *Crop Watch* in the article *New Herbicides*, it was stated that Plateau herbicide was a 2 lb per gallon of imazethapyr (Pursuit). Plateau formulation DOES NOT contain imazethapyr; the active ingredient has not been formally named. Plateau is used for pre and postemergence control of selective grass and broadleaf weeds in non-crop acres.

**Herbicide Guide Correction:** On page 24 of the 1997 *Guide for Herbicide Use in Nebraska*, Peak and Permit performance are misrepresented on a number of weeds in the postemergence broadleaf response table. Peak should be rated as a 1 on Kochia ALS Resistant, a 6 on Kochia Triazine Resistant, a 6 on Smartweed, a 9 on Sunflower, and a 1 on Waterhemp (ALS Resistant). Permit should be rated as a 1 on Kochia (ALS Resistant).

**John McNamara and Alex Martin**  
Extension Weed Science



# CROP WATCH

1997 University of Nebraska

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Lisa Brown Jasa, Editor

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# Narrow row corn: Factors to consider

The possible potential for higher corn yields has many producers discussing narrow row corn — corn planted in less than 30-inch rows. Many factors need to be considered in switching to a narrow row system, including: yield potential, weed control, planting in crop residue with less clearances, fertilizer application and timing, diseases, insects, equipment changes, and other costs.

Higher yield potential is often the first factor considered (See Table 1.) While narrow rows fairly consistently produced higher yields, the results are variable. In Iowa, the greatest potential for narrow rows is seen north of Interstate 80. In Nebraska, our zones for corn production run northeast to southwest. Other factors are less cloudy weather in Nebraska, elevation, the cool down in temperatures, especially in western Nebraska in the evening, etc. It remains to be determined if populations need to be higher to realize the yield gain.

Other factors to consider when deciding whether to adopt narrow row production is the potential for improved weed control and the possible need for different equipment.

Weed control under narrow row conditions is likely to improve since the rows are closer together, and the canopy closes sooner, providing more shade cover faster between rows.

Producers considering narrow row systems also need to consider their planting equipment. Farmers have had success in modifying their current planters into narrow row machines, or buying new equipment. Planting through heavy crop residues is more difficult with narrow rows.

The corn head also will have to be modified to harvest narrow rows. To narrow up the head and provide enough room for each row, one farmer has taken out the gathering chain on one side of the row and replaced it with an adjustable ear guide. One gathering chain is enough because with narrow rows, the plants are further apart and not as many ears are entering.

Table 1. Yield ranges for various plantings of narrow row corn.

<i>Yield Company or University</i>	<i>Years</i>	<i>Row spacing</i>	<i>Range</i>	<i>Avg.</i>
Pioneer Hi-Bred Int.	91-94	22.5" vs 30"	0 to 9%	4.0%
University of Minnesota	92-94	20" vs 30"	4.5 to 7.0%	6.6%
University of Illinois	91-92	20" vs 30"	5.5 to 9.3%	7.4%
University of Purdue	84-86	15" vs 30"	-3.1 to 8.2%	2.7%
Michigan State	89-91	22" vs 30"	-1.2 to 11.4%	8.8%

Other items that need to be considered include the increase in costs of soil applied insecticides, the application and timing of fertilizer and the effect on plant diseases.

With nearly equidistant plant spacing in narrow rows, each plant is not as crowded. The less crowded conditions lead to better root ball development of the plant.

Universities, seed companies, and farmers are also looking at twin rows — rows 6 to 10 inches apart. The goal is to have the plants alternate between the rows in a zigzag pattern. University of Nebraska research has shown

high plant populations planted in twin rows aid the plants in standing up during wind storms. At lower populations, the twin rows did not help much. Producers using 36-inch rows may benefit the most from twin rows. Most of these producers furrow irrigate and/or ridge-till. Twin rows set on 36-inch centers will enable them to have a wide, deep furrow and maintain a large ridge, which benefits the ridge till system.

**Robert N. Klein, Extension  
Cropping Systems Specialist  
West Central District  
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## Early weed control essential to successful no-till program

Successful no-till crop production requires good weed management. The following strategies will help you effectively control weeds under a no-till crop production system.

### *Early preplant strategy*

Preplant treatments can be applied 5 to 10 days before planting corn and 20 to 30 days before planting sorghum and soybeans. A preplant herbicide application, which includes both a grass and broadleaf herbicide, will normally provide season-long weed control in corn. However, an additional herbicide treatment may be needed at planting time if the initial application is 20 to 30 days ahead of

planting as in sorghum and soybeans, or if the soil is disturbed significantly during planting.

Early weed growth can be controlled successfully by applying an early preplant (EPP) herbicide. Ideally, an EPP herbicide is applied before weed seeds germinate. Most EPP treatments include a triazine herbicide, such as Atrazine, Bladex, Lexone or Sencor, which control small emerged broadleaf weeds and many grasses less than 1" tall. This effect can be increased by adding either 2,4-D, crop oil concentrate, or 28% UAN solutions. If the grasses are taller

*(Continued on page 16)*

# Early season insect control in corn

Producers should consider several new developments in soil insect control, particularly when it comes to corn rootworm control in continuous corn. In rotated cropping systems, a trend toward earlier planting dates emphasizes the need for managing seed and seedling attacking insects like wireworms and seedcorn maggots. We'll try to review the various methods of soil insect management, realizing that every operation is different and farmers must choose what is best for their operation.

## Corn rootworm control in corn

Corn rootworms are the most economically important insects in Nebraska. While in certain years other insects like the European corn borer may cause more yield loss, by far more money is spent controlling rootworms than any other insects. Almost all continuous corn acres are treated with an insecticide for rootworm control, either as a granular formulation at planting or cultivation time, or a liquid formulation applied post emergence for larva control or to kill adult beetles to prevent egg laying. These control methods adequately protect yield potential when materials are applied properly, at the right time, and under normal environmental conditions. Environmental conditions may have a major impact in performance of any control method. Refer to EC-1509, *Insect Management Guide Nebraska Corn and Sorghum*, for information on registered insecticides.

The surest way to eliminate rootworm problems is through crop rotation. Rootworm problems in crop rotations are extremely rare. While some areas of east central Illinois and northwest Indiana may be experiencing problems with western corn rootworms in strict corn-soybean rotations, this has not yet occurred in Nebraska. Isolated areas in Dixon and Cedar counties in northeast Nebraska have occasionally seen problems with northern corn rootworms in strict corn-oats rotations.

**Nebraska producers spend more money controlling rootworms than any other insect.**



Establishing multi-crop rotations is a good first step in managing many pest problems.

Most granular insecticides are applied at planting. Providing all materials are handled safely, advantages of this method are relative ease of application (most growers have insecticide boxes and know how to use them) and less worry about timing of treatments. In most years this method will provide adequate protection. In-furrow or banded applications perform similarly for rootworm control. Problems may occur when growers forget to calibrate application equipment (this should be done yearly regardless of whether the same product is used), high winds move the material away from the seed furrow or band, and early planting dates allow for environmental breakdown of the materials.

Insecticide labels require that granule materials should be incorporated with a chain or other soil disturbing device behind the press wheel. Any granules left on the soil surface will degrade rapidly and may cause harm to non-target animals. Rotation of insecticides is recommended to reduce the chances of resistance. While there is some variation in performance from year to year, all registered insecticides will perform satisfactorily under most conditions.

Cultivation-time applications of granular insecticides usually provide somewhat better root protection than planting time applications. This is because the material is applied closer to rootworm egg hatch, which normally can occur in Nebraska from late May through June. Reduced

insecticide rates often work well at this time. Disadvantages of this method are: 1) extremely wet weather conditions may not allow application and corn may grow past the point of getting over it with a tractor or 2) extremely dry conditions may fail to activate the insecticide.

Post emergence liquid formulations applied to control larvae are an alternative to granular applications. Chemigation of Lorsban 4E is popular with some growers. Furadan 4F applied by custom application or by the farmer also has gained a measure of acceptance. These applications also will perform adequately when timing of application coincides with egg hatch. Since timing is more critical than with granular applications, a regular scouting program should help determine time of application. One note: Data from Nebraska trials indicates that post emergence applications of Furadan 4F when applied for optimum rootworm control will not protect against first generation European corn borers. Corn borers will still need to be managed with other methods.

In some areas of Nebraska, growers manage rootworms by killing the adults in the late summer or early fall. Well timed applications prevent egg laying and a planting or cultivation time insecticide is then not necessary the next year. Many programs are designed as multiple applications to control other insects, like second generation European corn borer. In most areas of Nebraska this technique will work for rootworm management under a proper scouting program. However, mismanagement

(Continued on page 15)

## Early season insects *(Continued from page 14)*

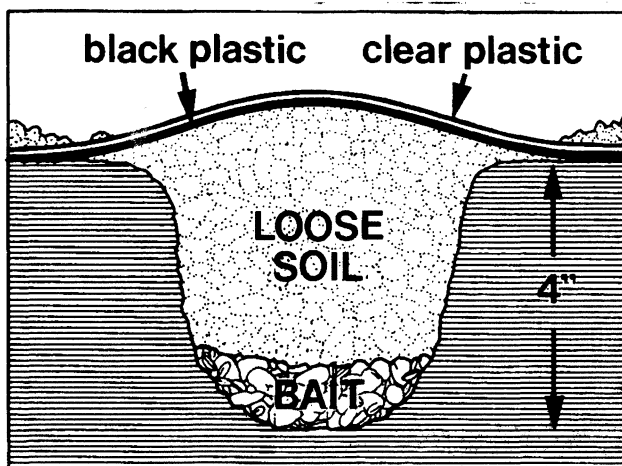
by repeated application of the same product has caused the onset of resistance to some materials applied to control adult beetles. Growers in affected areas (primarily York and Phelps counties) will have to choose alternative strategies; either a new class of insecticides, soil insecticides, or rotation away from continuous corn.

### Seed and seedling insect pests

Wireworms, seedcorn maggots, and white grubs have become an increasing concern for farmers in Nebraska. While there may not necessarily be any greater problems than we have had in the past, increased awareness has led many to believe the problem to be more severe than it was several years ago. Regardless of overall populations, it is necessary to plan to manage these insects because there are no rescue treatments available. Since granular soil insecticides usually control these insects, we don't normally worry about them in continuous corn. Usually economic damage from these soil insect pests in row crop rotations are pretty rare. You don't necessarily need a planter box seed treatment or soil insecticide unless there is a past history of problems in that field. However, planter box seed treatments should be considered:

- 1) When germination may be delayed due to adverse soil conditions such as wet and cool or dry soils. Early planted fields are more likely to fall into this category.
- 2) To protect new seedlings in fields that have a history of seedling diseases or insects.
- 3) In seed production fields.
- 4) When planting at low and/or sparse populations.
- 5) Fields previously in pasture or idled for several years.

Wireworms feed on the seeds and roots of corn, sorghum, small grains, grasses, soybeans, dry beans, sugarbeets, potatoes, and various other root crops. Wireworm feeding may reduce seed germination or produce weak seedlings. Wireworms eat the germ of the seeds or hollow them out completely, leaving only the



*Construction of a bait station for wireworms.*

seed coat. Larvae boring into the underground (mesocotyl) portion of the stem cause seedlings to die or become stunted. Seed treatments will reduce damage to seed, but will not protect emerged plant parts. Under heavy infestations of wireworms, a granular soil insecticide may be necessary. Bait stations may be used to assess levels of wireworm infestation before planting (NebGuide G91-1023). The bait consists of germinating corn and wheat seeds. Substances produced by the seedlings attract the wireworms to the bait. Bait stations should be set up two to four weeks before the planned planting date. They should be placed randomly throughout the field with a minimum of ten stations per field. Be sure to place stations in different parts of the field (areas with different soil types, low or high spots, etc.) to obtain a representative sample. If you find an average of one or more wireworms per bait station, use an in-furrow application of a labeled soil insecticide. If wireworms are present at low levels (less than one per station), seed treatment alone should be sufficient to prevent serious damage.

Seedcorn maggots attack the seeds of many crops before or just at germination, preventing germination by killing the newly emerging coleoptile. Damage from seedcorn maggots can be prevented by using a seed treatment.

White grubs feed on roots deeper in the soil. Crop emergence may appear normal in the beginning.



Later the stand becomes thin or patchy. Roots of crops are usually chewed off cleanly. White grubs can only be controlled by granular soil insecticides.

The seed corn beetle, while listed on many labels, is not normally a factor in seedling establishment.

The active ingredients in seed treatments are lindane and/or diazinon for insect control and a fungicide (i.e. captan, maneb) is often included to inhibit seedling diseases. Most have graphite included for smooth flow. While the graphite enhances flow, problems have been experienced with the graphite building on seed monitors of air/vacuum planters. To prevent this buildup some manufacturers have talc products to add to the mix to limit this problem. John Deere has a talc available.

These products come in packets, 1 lb bags, 5 lb bags or 10 lb bags. For corn, generally the rate used is 4 oz of product per 100 lb of seed. Under very hot conditions or with the use of poorly germinating seed, these products may cause seed injury. Follow label directions carefully. Costs run about \$1-\$1.50 per acre. Several companies offer these products under various trade names. Most local ag-chem dealers carry seed protectant products. Seed dealers also may have these products.

*(Continued on page 16)*

## Selecting corn hybrids

Choosing which corn hybrid to plant is one of the most critical decisions for many corn producers. While yield may be the primary concern, also consider hybrid characteristics, diversity, your field situation, and the seed company's reliability.

Yield differences between the top and bottom hybrids in University of Nebraska hybrid performance tests often may differ by 40-60 bushels per acre. Research at the South Central Research and Extension Center near Clay Center indicates that the hybrids that are most widely grown are not the highest yielding.

For more than 10 years researchers have surveyed producers to determine the most widely grown hybrids in south central Nebraska. These were then included in an irrigated hybrid performance test with other hybrids (up to 120 hybrids were tested per year). From 1991-1996, no widely grown hybrid yielded as well as the top hybrids in the trial. The widely grown hybrids yielded at or below the average.

Farmers tend to plant hybrids that have performed well in the past. Yield potential of newer hybrids is usually greater than that of older hybrids. Planting an array of corn hybrids that are genetically diverse can help account for the possible ups and downs which can't be predicted at planting, but which can devastate a crop. The high winds of late June and early July of 1993, 1994 and 1996 resulted in severe losses for particular hybrids (yields <30 bu/acre). Planting several diverse hybrids could have prevented severe losses.

When looking at diversity, consider maturity, and the hybrid's resistance to stalk lodging, ear drop, disease, and specific herbicides and insecticides.

Finally, deal with a reliable seed corn company. Price, service and seed quality vary from one company to another even if genetics are similar. Differences in seed production, environment, and seed handling, processing and grading can result in genetically similar hybrids performing differently.

**Roger Elmore, Extension Crops Specialist, South Central District  
(402) 762-4433**

## Early season insects *(Continued from page 15)*

Some farmers have begun using reduced rates of granular insecticides in-furrow as a substitute for seed treatments. Unfortunately, we have very little data on comparing reduced rates of soil insecticides with seed treatments for soil insect control. There are two reasons for this: 1) Despite all of the sales hype and concern, it is difficult to find fields with high enough wireworm populations to test the materials adequately; and 2) Companies discourage testing at below labeled rates. If you do use below labeled rates of a soil insecticide, the chemical companies are under no obligation to compensate you for loss.

Normally once there is an established row crop rotation with good weed control, seed attacking insect populations are relatively low and a seed treatment such as Kernel Guard or Agrox D-L will give stand protection equal to that of a soil insecticide at much less cost (around \$1 an acre for seed treatment vs \$16-

\$20 for a soil insecticide). In most cropping situations, a seed treatment is the best economic return over the course of many years' use. It is excellent for seedcorn maggot protection and most wireworm situations. For farmers with air planters or those who do not like working with the dusty conditions produced by seed treatments, there is a new product called "Raze" which can be applied to the seed in a liquid slurry before planting. This would be more expensive than a regular seed treatment, since someone would have to treat the seed. The active ingredient of Raze, tefluthrin, is the same as that in Force insecticide. However, Raze is only a seed protectant and would not protect against cutworms or rootworms.

**Keith Jarvi, Extension Assistant  
Integrated Pest Management  
Northeast District (402) 584-2853  
Bob Wright, Extension Entomologist  
South Central District**

## No-till weed control *(Continued from page 13)*

than one inch, include Roundup or Gramoxone Extra.

No-till planters equipped with certain coulters disturb the herbicide barrier in the row, which can result in "weed escapes." In this case, apply either a pre-emergence or post-emergence herbicide over the row.

The early preplant strategy has several advantages. Because weeds are not established, early season weed control is usually more consistent, soil moisture is conserved, and the expense of the burndown herbicide is eliminated. The main disadvantage is that early preplant applications will fail if rainfall does not activate the herbicide treatment. Also, if planting is delayed because of excessive rainfall, the herbicide may dissipate, shortening the period of weed control. For late planted crops, including sorghum and soybeans, sequential herbicide treatments are usually needed to maintain season-long control.

## Early preplant plus pre-emergence or postemergence strategy

Soybean and grain sorghum planting usually follow corn by 10 to 30 days. Early preplant treatments in these crops are usually applied 20 to 40 days before planting. A single early preplant herbicide application may not provide season-long control.

A split application, with one portion of the herbicide (1/3-2/3 of full rate) applied early preplant and the other at planting time, helps maintain control. Another strategy is to apply an early preplant treatment and follow up with a postemergence herbicide program. Not only are the operations spread out over an extended period, but you can choose the herbicide to match the weed problem. Split or sequential applications often provide the most consistent weed control in soybeans.

*(Continued on page 18)*



# Cultural practices, then fungicide for gray leaf spot

Gray leaf spot is caused in corn by the fungus, *Cercospora zeae-maydis*. Corn is susceptible to gray leaf spot at any stage of growth. Disease development depends on a specific microclimate — leaf moisture, high relative humidity, cool to moderate temperatures, overcast weather — occurring for two or more days.

Initial infection of the gray leaf spot fungus occurs when spores are blown or washed onto a leaf. The fungus gains entrance through a natural opening, such as a stomata, or through plant wounds. Spores germinate by producing a hyphal filament called a germ tube. The germ tube extends along the plant surface, seeking an opening. If optimum weather conditions exist, infection can occur. If the hyphal filament becomes dry, however, the fungus will die.

Environmental conditions in Nebraska in 1995 and 1996 were optimum for disease development.

## Symptoms

Gray leaf spot will appear first as a tiny, dark, water-soaked spot ringed by a thin, yellow halo. At this stage it is difficult to differentiate it from other damage, such as holcus spot or weather or insect damage. In the next two to three weeks, however, the spot will take on a more unique linear-rectangular appearance. Gray leaf spot will appear on mature leaves as tan to brown, ½ to 1 ½ inch long,

## UNL now recommends chemical treatment at the first confirmation of gray leaf spot

narrow lesions with parallel sides and squared-off ends. The width of the lesion is limited by the small veins of the leaf, hence the parallel sides. As the number of infections increase, the spots grow together resulting in larger blighted areas.

The lesions are tan until dense sporulation under humid conditions produces a grayish cast; hence the common name.

The primary inoculum is infected corn residue on the soil surface. The fungus is a poor competitor with other soil microbes. The pathogen survives from one season to the next only if surface debris is present. The spores are produced two to three weeks after infection as the lesions mature. These spores cause secondary infections and spread the disease further within and between adjacent plants and fields. Several secondary cycles may occur during the growing season if weather conditions favor disease development.

Optimum weather conditions for gray leaf spot development are:

- 1) two or more days of continuous high relative humidity (90% or more for a minimum of 12 hours),
- 2) free moisture on leaves from dew, fog, or light rain or irrigation (for a minimum of 12 hours),
- 3) overcast days, and
- 4) moderate to high temperatures (75-85°F).

## Management

Gray leaf spot can be managed by:

- 1) crop rotation,
- 2) hybrid selection,
- 3) tillage practices, and
- 4) fungicidal applications.

**Crop rotation.** Rotating infected fields to non-host crops such as soybeans, sorghum, small grains or alfalfa will reduce the inoculum potential within that field. A two-year rotation is preferable for no-till

fields. If the field is surrounded by heavily infected fields, select a hybrid with gray leaf spot resistance.

**Hybrid selection.** Most dent corn hybrids have a moderate degree of genetic susceptibility to gray leaf spot. A few are very susceptible and a few are very resistant. Unfortunately, no hybrids are immune to the disease. Some hybrids with a high degree of resistance have lower yield potential (in the absence of gray leaf spot) than hybrids with lower degrees of resistance.

**Tillage.** The fungus survives from season to season only in infected debris. When residues decompose, the disease source is gone. Completely burying the residue of an infected crop will significantly reduce the risk of early disease development in a single year.

If clean plowing is not desired because of soil erosion, government programs or other factors, combine rotation and hybrid selection.

**Fungicidal applications.** In light of the increased incidence of gray leaf spot the last two years and the potential for widespread inoculum in non-buried residue from past outbreaks, the University of Nebraska has changed its chemical treatment recommendation. At the first sign of disease, samples should be collected and submitted for diagnosis to a plant diagnostics laboratory or qualified consultant. If your suspicions are confirmed, treat the affected area with a fungicide labeled for gray leaf spot.

Fungicides include Tilt and several mancozeb products, such as Manzate 200DF, Dithane formulations (including DF, F-45, M-45 and WSP), Penncozeb and Penncozeb DF. Certain application, harvest, and/or grazing restrictions apply in all cases so read labels carefully.

**Dave Wysong, Extension Plant Pathologist, Lincoln, (402) 472-2559**

## Crop Watch online

This week the Web version is presenting a *Special Focus* on gray leaf spot, including color photos to aid in disease identification. A free version of the *Crop Watch News Service* is currently available on the web at <http://www.ianr.unl.edu/cropwatch/>; however a password system is expected to be implemented soon. The cost for a web subscription is \$30.



# EPA changes restrictions near tile terraces

The Environmental Protection Agency has announced a change for the 1997 growing season on the label requirements for atrazine and cyanazine use around tile-terrace riser pipes.

Currently if atrazine or cyanazine is used, a 66-foot no-spray setback area was required around tile riser pipes if they drain to surface water. Based on University of Nebraska-Lincoln (UNL) and Iowa State University (ISU) research, the EPA has approved two alternatives to the setback requirement which may be used this year.

Farmers can now choose to: 1) continue using the 66-foot setback around tile riser pipes; 2) incorporate atrazine and cyanazine in the soil to a depth of 2-3 inches; or 3) apply atrazine and cyanazine if no-till and high crop residue management is used. These alternatives apply to the entire field draining to the riser pipe, not just the 66-foot setback area. High crop residue management means that little or no crop residue is removed from the field during or after harvest.

The producer must possess the supplemental label for either atrazine or cyanazine to use these alternatives.

The 66-foot setback requirement has been in place since 1992 when it was adopted to protect surface water quality. However, some farmers and commercial applicators have disliked it because it costs time and money to manage the small setback areas differently than the rest of the field.

In 1994 University of Nebraska and Iowa State University jointly researched the effectiveness of various management practices in reducing herbicide runoff from tile-outlet terraces. The UNL research included four herbicide management practices on twelve individual tile-terrace outlet fields in Nebraska, Iowa, and Missouri. The four management practices were the no-spray setback, no-till, herbicide incorporation, and tillage without incorporation, all with surface-applied herbicide.

It was found that the setback is only effective in proportion to the

field area not sprayed. Herbicide runoff was reduced but only because of the reduction of total herbicide applied. The setback did not reduce the runoff from the remainder of the field area. A setback can reduce herbicide runoff by 20-25% if the area contributing runoff to the terrace is approximately one acre in size.

For larger areas other management practices are more effective. Soil incorporation reduced the herbicide in runoff by 25-35%. The most dramatic runoff reduction occurred with no-till. The total amount of

herbicide lost was reduced by 90%, attributed to a 72% reduction in runoff water.

In 1995 DuPont and Novartis (formerly Ciba) submitted to EPA the UNL and ISU reports that supported adoption of incorporation and no-till as alternative management practices. A subsequent report was submitted in mid-1996, to answer EPA questions about the research. In February 1997, EPA announced the rule change.

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## No-till weed control *(Continued from page 16)*

### Planting time strategy

A pre-emergence herbicide is applied in combination with a nonselective, foliar applied herbicide, such as Gramoxone Extra or Roundup. The nonselective herbicide controls established weeds and the residual herbicides provide weed control for the rest of the season. With corn that is planted before weeds become well established, Gramoxone or Roundup are usually not required.

The advantage of planting time treatments is that a single herbicide application controls the weeds. The disadvantages are the added cost of the "burndown" herbicide, where needed, erratic weed control if the weeds are excessively tall or dry weather follows application, and depleted soil moisture early if weed growth develops.

### Burndown + postemergence strategy

Another approach using entirely postemergence herbicides involves a burndown treatment 0 to five days before planting followed by a postemergence treatment(s). Including a low rate of a residual herbicide with the burndown treatment delays weed establishment allowing a post treatment to be applied later. There is a need for the burndown treatment prior to planting sorghum and soybeans. Weed growth prior to corn

planting is often minimal.

Economical preplant broadleaf weed control without tillage is available with 2,4-D and Banvel. The time saving of eliminating tillage may be an important consideration. Crop safety may require a delay in planting following treatment. Corn on fine textured soils can be planted seven days after an application of 1 pt. 2,4-D ester (4 lb/gal) or 1/2 pint Banvel per acre. Sorghum is more sensitive than corn and planting should be delayed 7-10 days following the same treatments. Soybeans can be planted seven days after an application of 1 pint/A 2,4-D<sup>e</sup>. Banvel should not be used prior to soybean planting.

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**Next week's  
focus will be on  
converting CRP  
acres to cropland.**

## Spray when weeds are still small

# Controlling broadleaf weeds in winter wheat

Effective broadleaf weed control in winter wheat is critical to the success of reduced and no-till programs that rely on weed-free winter wheat stubble. Herbicides, along with crop competition and crop rotation, may be used to control broadleaf weeds in the growing winter wheat crop. Consider these points before selecting a herbicide treatment:

1. Identify the problem weed(s).
2. Spray when weeds are small and actively growing. Spray at the proper winter wheat growth stage for the herbicide used.
3. Use proper spray equipment that is in good condition and not contaminated with previously used herbicides.
4. Calibrate the sprayer to ensure application accuracy.
5. Read and follow directions on the herbicide label.
6. Know your rotational plans to avoid herbicide carryover to sensitive crops.

Many broadleaf weeds commonly found in Nebraska winter wheat fields can be controlled at a modest price with 2,4-D. Generally, low volatile ester formulations of 2,4-D provide better broadleaf weed control than amine formulations because they are oil soluble and readily penetrate plant foliage. Ester formulations are more active than amine formulations and should be applied at lower rates. Winter wheat must be between four tillers and joint stage when 2,4-D is applied. In Nebraska, winter wheat generally is in the proper growth stage for 2,4-D application in March to early May, depending upon planting date, the season and location.

Banvel and 2,4-D are combined to control a wider spectrum of broadleaf weeds, including kochia and wild buckwheat. Banvel must be applied to well tillered wheat and before jointing to avoid crop injury.

The sulfonylurea herbicides Ally, Amber, Canvas (a premix of Harmony Extra + Ally), Finesse, and Harmony Extra have soil persistence

and, therefore, will control germinating broadleaf weeds for about four weeks after application. A surfactant (at 0.25% v/v) should be added to the spray solution whenever Ally, Amber, Canvas, Finesse, or Harmony Extra is used. The addition of 2,4-D improves activity on weeds and helps prevent resistant weed buildup. These herbicides have rotational restrictions of one to 36 months that limit their use in areas where susceptible crops are grown in rotation with wheat. This may be especially troublesome when the wheat crop is lost to hail or other crop failures. The degradation rate of Ally, Amber, Canvas, and Finesse in soil is slowed by high soil pH. Do not apply these products to soils with a pH greater than 7.9 to avoid the risk of rotational crop injury.

Buctril controls many broadleaf weeds in wheat with excellent crop

safety. Buctril is a contact herbicide, therefore, weeds must be small and good coverage with the spray solution is needed. It can be tank mixed with 2,4-D to improve performance on larger weeds and to broaden the spectrum of weeds controlled.

Mixing nitrogen fertilizers (UAN) and herbicides (particularly 2,4-D + a sulfonylurea) to control weeds and fertilize the crop with one application has resulted in occasional crop injury (see *Managing nitrogen in winter wheat* in the March 14 *Crop Watch*). We are not able to accurately predict the degree of damage or yield depression even if there is visual damage.

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## Wheat disease reports good; but watch out for incoming rust

The wheat disease situation this spring has been quiet. Recent surveys in eastern and central Nebraska did not detect any significant problems. Moisture last fall helped firm seedbeds and snow cover this winter provided protection against low temperature injury. This resulted in good uniform stands this spring.

On the horizon, Kansas is reporting leaf rust from their southern tier of counties into northeast Kansas. Since at least half of the Nebraska wheat acreage is planted to leaf rust-susceptible varieties, the developing rust situation in Kansas and Oklahoma bears watching. Based on prior fungicide trials at Clay Center, leaf rust that develops rapidly between early May and early June can significantly reduce yields on susceptible varieties.

As the wheat breaks dormancy and resumes growth, symptoms of

soil-borne mosaic will become evident. Soil-borne mosaic occurs through much of eastern and south central Nebraska and has also been found in fields in the west central area. Yellow-chlorotic areas in fields that are often associated with low spots, terrace channels or drainage areas are characteristic of soil-borne mosaic patterns. Yields will vary considerably between affected fields.

Tan spot and Septoria leaf blotch produce brown lesions on leaves. On young wheat, infected leaves yellow as the spots become more numerous and increase in size. The greatest impact of tan spot, Septoria leaf blotch or leaf rust is their severity during grain fill, so a little yellowing now from tan spot or Septoria leaf blotch should be of great concern.

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# Treatment options for triazine-resistant kochia

Kochia is a summer annual weed that germinates in early spring and is particularly troublesome in conservation tillage systems. Kochia is normally readily controlled with Atrazine, Bladex, Lexone, and Sencor. However, in many areas of western and central Nebraska, kochia has developed resistance to triazine herbicides. Several control strategies can be used to control both susceptible and triazine-resistant kochia. Also, Kochia in some areas has become resistant to the sulfonyleurea and imidazolinone herbicides.

In ridge-till or no-till corn, Banvel is an effective herbicide for triazine resistant (TR) kochia control. Gramoxone Extra and Landmaster BW are effective on emerged kochia when applied before planting. Triazine-resistant kochia is very difficult to control with 2,4-D. Also, some kochia biotypes are tolerant to 2,4-D and Banvel. Banvel resistant kochia also has been reported in Colorado and Montana. Banvel resistant Kochia has occurred, because of repeated applications over years. Use Buctril or Tough if the kochia is resistant to Banvel.

For ridge-planted or no-till corn or sorghum, it's important to spray prior to planting while the weeds are small. Banvel at 1/2 pint per acre may be applied before, during or after planting corn on coarse, medium, and fine textured soils with less than 2% organic matter. Check with your seed dealer for corn tolerance to Banvel for the hybrid selected. For sorghum, Banvel at 1/2 pint per acre may be applied 15 to 20 or more days prior to planting. In western Nebraska, use 20 days. Crop residue pushed aside during planting may protect weeds if sprayed after planting. Most problems with kochia in ridge-till occur when the planter openers do not cover kochia with soil at planting. Many ridge tillers set their planters to remove less ridge which reduces the effectiveness of weed control along the sides of the ridge.

In fields where a seedbed is prepared for corn, use a tandem disk harrow or other tillage implement ahead of planting to kill emerged weeds. A mixture of Banvel at 1/2 to 3/4 pints per acre depending on soil texture and organic matter plus

preemergence herbicides offers good kochia control in corn. Preemergence applications of Banvel at 3/4 or 1 pint per acre in corn can only be used on medium and fine textured soils with 2% or more organic matter.

Delaying planting can be used to your advantage, since additional kochia can emerge and be killed with tillage. However, corn yields may be reduced by planting later.

Several herbicides may be applied postemergence on corn and sorghum. The safest time to apply Banvel to corn is from the spike to five-leaf stage. Banvel may be applied when the sorghum is in the three to five leaf stage. In corn 8 to 36 inches tall use drop nozzles and direct spray solution to the lower half of the plant. Do not use Banvel within 1/2 mile of sugarbeet, field bean, alfalfa, soybean, gardens, and ornamentals. Do not use Banvel between June 20 and September 1.

Marksman at 2 pints per acre for kochia less than 2 inches tall or 3 pints per acre for kochia less than 4 inches tall has been effective. Use Buctril/atrazine at 2 pints per acre on kochia less than 2 inches tall and 3 pints per acre on kochia less than 4 inches tall. Banvel at 1/4 pint per acre added to the Buctril/atrazine mix will help control taller kochia.

Tough sold by Novartis, is very effective on triazine-resistant kochia at 1 quart per acre. At this rate the price is around \$14/acre. Using Tough at 1 pt per acre plus atrazine at 0.5 pint has controlled small kochia less than 1 inch. Tough controls some broadleaf weeds while the atrazine controls most broadleaf weeds missed by Tough and provides some grass control.

Buctril can be applied before planting up until corn or grain sorghum emergence to control actively growing weed seedlings. It also may be used postemergence on grain sorghum in the three-leaf stage to tassel emergence. Banvel plus Buctril probably gives the most consistent control.

Triazine-resistant kochia can be controlled in ridge planted or no-till soybean with Roundup at 1 pt per acre plus Pursuit, Pursuit Plus, Command, Canopy, or Gemini prior to crop emergence. These treatments should be

applied 7 to 30 days before planting depending upon the size of the kochia. Gramoxone Extra does not work with these herbicides. Command applied preemergence or preplant incorporated will control kochia in soybeans. Soil applied treatments effective against Russian thistle include Sonalan, Treflan, Sencor, Lexone, Scepter, Preview, and Pursuit.

Postemergence herbicides that are effective on triazine-resistant kochia on tilled ground include Pursuit, Classic, Classic + Pinnacle, and Basagran 1 GPA 28% UAN. Kochia must be sprayed when less than 2 inches tall. Herbicides should be applied within 30 days of planting.

**Gail Wicks, Bob Klein and Alex Martin**

**Extension Weeds Specialists**

## Diagnostic Clinic update

*This year we will feature a weekly summary from the University of Nebraska Plant and Pest Diagnostic Clinic.*

**Entomology:** Samples have indicated swarming activities of carpenter ants, yellow (citronella) ants and subterranean termites and increasing activity for insects that overwinter in structures.

**Plant Pathology:** Greenhouse samples indicated 2,4-D injury, root rot problems, and Fusarium wilt of tomato. Several corn ears were submitted for ear rot identification.

**Weed Science and Horticulture:** Weed Science was asked about a product called W.O.W. It is a by-product of corn processing called corn gluten meal. This product is toxic to many emerging weeds. The use rates needed to achieve any type of weed control or fertility is quite high and may be prohibitive due to cost. It is a herbicide alternative, but caution is recommended if you plan to rely on it for complete weed control and use as a fertilizer.

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